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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/605,672

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Bruce B. Doris

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10/18/2005

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EXAMINER

ISAAC, STANETTA D

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/605,672

Applicant(s)

DORIS ET AL.

Examiner

Stanetta D. Isaac

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2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-8 and 12-14 is/are rejected.
- 7) ☒ Claim(s) 9-11 and 15-18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 8/25/05.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

This Office Action is in response to the amendment filed on 8/02/05. Currently, claims 1 and 4-18 are pending.

#### ***Information Disclosure Statement***

The information disclosure statement (IDS) was submitted on 8/25/05 was filed after the mailing date of the Office Action on 5/11/05. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

#### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the at least one overhang being in the parallel and transverse direction must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the

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drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 4-6 and 12-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is indefinite, in claim 1, whether a "p-FET device" has at least one overhang arranged in a direction parallel to or transverse the current flow.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Trivedi US Patent 6,583,060 in view of Jin et al, US 5940,716.

Trivedi discloses the semiconductor structure substantially as claimed. See figures 1-15, and corresponding text, where Trivedi shows, pertaining to claim 7, a semiconductor structure formed on a substrate, comprising: an n-channel field effect transistor having a source **111**, a drain **111**, a gate **70**, and a direction of current flow from the source to the drain (figure 12; col. 4, lines 57-67; col. 5, lines 29-55); and a first shallow trench isolation **50** for the n-channel field effect transistor the first shallow trench isolation having a first shallow trench isolation side in a direction parallel to the direction of current flow for the n-channel field effect transistor. In addition, Trivedi shows, pertaining to claim 8, wherein the first shallow trench for the n-channel field effect transistor further comprises: a second shallow trench isolation side being transverse to the first shallow trench isolation side in a direction transverse to the direction of current flow for the n-channel field effect transistor (figure 12; col. 5, lines 45-55, *Note*: the Examiner takes the position that it is inherent that a trench isolation region will have both parallel and transverse directions, based on the admitted prior art disclosed in figure 7, and paragraph [0034], where a shallow trench isolation will include four sides that surround the active device region).

However, Trivedi fails to show, pertaining to claim 7, the first shallow trench isolation side having a least one overhang configured to prevent oxidation induced stress in a direction parallel to the direction of current flow for the n-channel field effect transistor. In addition, Trivedi fails to show, pertaining to claim 8, the second shallow trench isolation side having at least one overhang configured to prevent oxidation induced stress in a direction transverse the direction of current flow for the n-channel field effect transistor.

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Jin teaches, in figures 1-24, and corresponding text, the first shallow trench isolation side having at least one overhang that is configured in the parallel direction. In addition, Jin suggest that at least one overhang may also be configured in the transverse direction, since the isolations appears to surround the active regions (figure 14; col. 2, lines 10-22; col. 4, lines 10-13; col. 5, lines 10-21).

It would have been obvious to one of ordinary skill in the art to substitute, the first shallow trench isolation side having a least one overhang configured to prevent oxidation induced stress in a direction parallel to the direction of current flow for the n-channel field effect transistor; and the second shallow trench isolation side having at least one overhang configured to prevent oxidation induced stress in a direction transverse the direction of current flow for the n-channel field effect transistor, in the method of Trivedi, pertaining to claims 7 and 8, according to the teachings of Jin, with the motivation to eliminate the conventionally known problem of stress, such as the prevention of bird's beak, which causes a generation of leakage currents, resulting in a deterioration of the characteristics of the devices formed in an adjacent active region.

#### ***Allowable Subject Matter***

Claims 9-11 and 15-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:  
The closest prior art of record, Trivedi US Patent 6,583,060 in view of Jin et al., US Patent

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5,940,716, fails to show, pertaining to claim 9, “a second shallow trench isolation for the p-channel field effect transistor having a third shallow trench isolation side, the third shallow trench isolation side being devoid of an overhang; and the second trench isolation for the p-channel field effect transistor further having a fourth shallow trench side, the fourth shallow trench isolation side being transverse to the third shallow trench isolation side and having at least one overhang configured to prevent oxidation induced stress in a direction transverse to the direction of current flow for the p-channel field effect transistor.”

### ***Response to Arguments***

Applicant's arguments filed 8/02/05 have been fully considered but they are not persuasive. In the Remarks on pages 8-17:

Applicant raises the clear issue as to whether or not the objected drawings indeed shows at least one overhang being in the parallel and transverse direction.

The Examiner takes the position the objection to the drawings is maintained since it fails to show, at least one overhang in parallel and transverse direction. Specifically, figure 8, illustrates that the “pFET” device having at least one overhang in the transverse direction of current flow, however, it appears that figure 11, shows a “nFET device” where the cross-sectional view of the “pFET device” is in the transverse direction. In addition, figure 9 illustrates that the “nFET device” having overhang in the parallel direction to current flow, however, it appears that figure 10, shows a “pFET device” where the cross-sectional view of the “nFET device” is in the transverse direction of current flow. The Examiner takes the position that according to the two devices “nFET” and “pFET”, respectively, there is no illustration of at least

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one overhang is in **both the parallel and transverse direction** of current flow. Specifically, the same overhang, in both parallel and transverse direction of current flow.

Applicant raises the clear issue as to whether or not Trivedi alone or in combination with Jin suggest at least one overhang in the configured to prevent oxidation induced stress in a direction parallel or transverse to the direction of current flow for the n-channel field effect transistor.

The Examiner takes to position that the semiconductor structure as taught by Trivedi taken in combination with the solid teachings of Jin, would lead to one of ordinary skill in the art to substitute the overhang as taught by Jin for the shallow trench isolation region in Trivedi the motivation to eliminate the conventionally known problem of stress, such as the prevention of bird's beak, which causes a generation of leakage currents, resulting in a deterioration of the characteristics of the devices formed in an adjacent active region. In addition, by the Applicant's own admission, that a trench isolation region will have both parallel and transverse directions, where the shallow trench isolation will include four sides that surround the active device region. Therefore, by use of conventionally known T-shaped isolation techniques at taught by Jin, configuration of the overhang for the parallel or transverse direction of current flow will be obtained.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



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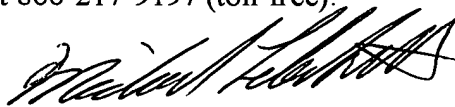
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stanetta D. Isaac whose telephone number is 571-272-1671. The examiner can normally be reached on Monday-Friday 9:30am -6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stanetta Isaac  
Patent Examiner  
October 15, 2005

  
**MICHAEL LEBENTRITT**  
SUPERVISORY PATENT EXAMINER